

Application No.: 10/789,171

Docket No.: JCLA10543

REMARKS**Present Status of Application**

The Office Action dated April 06, 2005, objected the drawings for not showing every feature of the invention specified in the claims. Claims 5 and 10 were rejected under 35 USC§102(e) as being anticipated by Danvir et al. (US Publication No. 2004/0169275). Claims 6-9 were rejected under 35 USC§103(a) as being unpatentable over Danvir et al. and in view of Nakazawa et al. (US Patent No. 6,448,665).

Claims 5 have been amended for correcting informalities and providing more descriptions, while claim 7 has been cancelled. No new matter has been added to the application by the amendments made to the specification, claims and drawings. This Amendment is promptly filed to place the above-captioned case in condition for allowance. After entering the amendments and considering the following discussions, a notice of allowance is respectfully solicited.

Discussion for the objections

The drawings were objected for not showing every feature of the invention specified in the claims, especially the feature "gold bumps from a plurality of gold wires" recited in claim 7.

In response to this objection, claim 7 has been cancelled.

Withdrawal of this objection is respectfully requested.

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Discussion for 35 USC§102 and 103 rejections

Claims 5 and 10 were rejected under 35 USC§102(e) as being anticipated by Danvir et al. (US Publication No. 2004/0169275). Claims 6-9 were rejected under 35 USC§103(a) as being unpatentable over Danvir et al. and in view of Nakazawa et al. (US Patent No. 6,448,665).

The Office Action considered that Danvir et al. substantially disclosed this invention.

Claim 5 has been amended to provide more descriptions for clarification purposes, according to the present invention. Supporting grounds for this amendment can be found at least in figure 2D and the related descriptions in the specification.

Applicants submit that amended independent claim 5 patently defines over the prior references for at least the reason that the cited art fails to disclose each and every feature as claimed in the present invention.

The independent claim 5 recites:

5. A flip-chip packaging process, comprising at least the steps of:
providing a chip and a substrate, wherein the chip has an active surface with bonding pads disposed thereon, and the substrate has a carrying surface with bump pads disposed thereon, wherein locations of the bump pads correspond to locations of the bonding pads;
disposing a plurality of supporters at a periphery of the active surface, and forming an uncured electrically conductive adhesive bump on each bump pad;
situating the chip over the carrying surface of the substrate to connect the active surface and the carrying surface via the supporters with a distance between the active surface and the carrying surface;
pressing the chip toward the substrate to decrease the distance between the active surface and the carrying surface, so as to cause elastic strain in the supporters and increase a contact area between each pair of electrically conductive adhesive bump and bonding pad;
stopping pressing the chip, so that the electrically conductive adhesive bumps, each connecting a bonding pad and a corresponding bump pad, have a smaller diameter at a central portion thereof than at end portions thereof; and
curing the electrically conductive adhesive bumps.

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Applicant respectfully asserts that claim 5 is patentably distinct from the prior art structures, especially at least “pressing the chip toward the substrate to decrease the distance between the active surface and the carrying surface, so as to cause elastic strain in the supporters and increase a contact area between each pair of electrically conductive adhesive bump and bonding pad”, as well as “stopping pressing the chip, so that the electrically conductive adhesive bumps, each connecting a bonding pad and a corresponding bump pad, have a smaller diameter at a central portion thereof than at end portions thereof”.

Danvir et al. merely discloses attaching a bumped area-array device 210 to the substrate 250. The bumped area-array device 210 includes a plurality of connective bumps 220 formed on the pads 214 thereof. As shown in Figure 2b, a solder paste 230 is applied to pads 252 of the substrate 250, while an underfill material 240 is applied on a portion of the substrate 250. The interconnection surface of the device 210 is positioned adjacent the underfill material 240 (see abstract). During reflow, the bumped area-array device 210 connects to the substrate 250 through the connective bumps 220, and the underfill material 240 flows around sides of the bumps 220 (paragraph [0060]).

The Office Action considered Danvir’s pads 214, pads 252 and underfill material being respectively comparable to the bonding pads, bump pads and the supporters of this application. Applicant respectfully disagrees with this consideration.

At first, Danvir teaches forming the bumps 220 on the pads 214 of the bumped area-array device 210, rather than on the pads 252 of the substrate 250 as recited in claim 5. Secondly, even if considering Danvir’s underfill material layer 240 being comparable to the supporters of this

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invention, Danvir fails to teach or suggest that the supporters are disposed at a periphery of the active surface of the chip, as recited in claim 5. Contrarily, the underfill material 240 is applied to the surface of the substrate 250. Furthermore, Danvir fails to disclose steps of pressing or stop pressing the chip, as well as the electrically conductive adhesive bumps having a smaller diameter at a central portion thereof than at end portions thereof. In addition, Danvir mentioned nothing related to the step of situating the chip over the carrying surface of the substrate with a distance between the active surface and the carrying surface.

Accordingly, the process of the present invention is patentably distinct from the prior art reference Danvir because Danvir fails to disclose all limitations of independent claim 5. As a result, Danvir did not anticipate the present invention as suggested by the Office Action, to arrive at the present invention as recited in independent claim 5. For at least the foregoing reasons, all pending claims patently define over the cited reference and should be allowed.

Consequently, reconsideration and withdrawal of these 102 rejections are respectfully requested.

Regarding claims 6-9, the Office Action further relied on Nakazawa et al. for teaching the gold bumps and the silver filler.

Claim 7 has been cancelled. As discussed above, the process of the present invention is patentably distinct from the prior art reference because Danvir fails to disclose all limitations of independent claim 1. However, Nakazawa fails to remedy the deficiencies of Danvir, because Nakazawa does not teach or suggest the above mentioned lacking features.

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Moreover, Nakazawa merely discloses conductive bumps 16 being made of gold or solder. However, nothing is mentioned or recited by Nakazawa relating to "disposing the supporters comprising disposing a plurality of gold bumps" as recited in claim 6. Similarly, Nakazawa simply teaches dispersing silver as a filler between the heat plate and the semiconductor element. But, Nakazawa does not teach or suggest conductive adhesive bumps comprising a polymeric material doped with conductive particles, or the conductive particles comprising silver, as recited in claims 8 and 9.

Therefore, it is respectfully submitted that claim 6, 8 and 9 patentably distinguishes over the cited references, either alone or in combination, for at least the reasons stated above as well as for the additional features that this claim recites.

Withdrawal of these rejections under 35 USC 103(a) is respectfully requested.

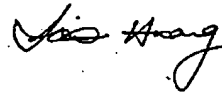
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CONCLUSION

In view of the foregoing, it is believed that all pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Respectfully submitted,
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